CLAIMS

1. A refrigeration system comprising:

a heat absorption unit for absorbing heat from a peripheral portion to fluid under a predetermined constant pressure;

a first compression unit for sucking the fluid discharged from the heat absorption unit and compressing;

an intermediate cooling unit for cooling the fluid compressed in the first compression unit;

a second compression unit for re-compressing the fluid discharged from the intermediate cooling unit;

a heat radiating unit for radiating heat from the fluid compressed in the second compression unit and discharged to a peripheral portion under a predetermined constant pressure;

an expansion unit for lowering pressure of the fluid which passed through the heat radiating unit by an adiabatic expansion and driving the first and second compression units by work generated from the expansion; and

a cooling flow path for passing the fluid discharged from the expansion unit through the intermediate cooling unit.

2. The system of claim 1, further comprising a driving unit for driving the first and second compression units, wherein the first and second compression units are sequentially connected to a driving shaft of the driving

unit.

3. The system of claim 1 or 2, wherein the expansion unit is connected to the driving shaft so that the fluid can be expanded and thereby the driving shaft be rotated toward a direction that the fluid is compressed.

4. The system of claim 3, wherein the first compression unit and the second compression unit respectively includes:

an inner gear engaged to the driving shaft to rotate and having a plurality of teeth at an outer circumference surface thereof; and

an outer gear having insertion teeth the number of which is more than the number of teeth of the inner gear at an inner circumference surface thereof insertable by the plurality of teeth and having a center which is eccentric with a center of the inner gear.

5. The system of claim 3, wherein the expansion unit includes:

an inner gear engaged to the driving shaft to rotate and having a plurality of teeth at an outer circumference surface thereof; and

an outer gear having insertion teeth the number of which is more than the number of teeth of the inner gear at an inner circumference surface thereof insertable by the plurality of teeth and having a center which is eccentric with a center of the inner gear.

6. The system of claim 5, wherein the first compression unit, the

second compression unit, and the expansion unit have the outer gears of which radii are equal, and have the inner gears of which radii are equal.

7. The system of claim 5, comprising:

a first partition wall unit installed at one side of the first compression unit and having a bearing unit into which the driving shaft is rotatably inserted, a first suction port for sucking the fluid to a compression chamber of the first compression unit, and a first discharge port for discharging the fluid from the first compression unit;

a second partition wall unit installed between the first compression unit and the second compression unit and having a second suction port for sucking the fluid from the intermediate cooling unit to a compression chamber of the second compression unit;

a third partition wall unit installed between the second compression unit and the expansion unit and having a second discharge port for discharging the fluid from the second compression unit and a third suction port for sucking the fluid from the heat radiating unit to the expansion unit; and

a fourth partition wall unit installed at the opposite side of the second partition wall unit on the basis of the expansion unit and having a third discharge port for discharging the fluid from the expansion unit.

8. The system of claim 1, comprising:

a plurality of partition wall units installed among the first compression

unit, the second compression unit, and the expansion unit; and

a plurality of external wall units installed at a front end portion of the first compression unit and a rear end portion of the expansion unit for forming a compression chamber and an expansion chamber.

9. The system of claim 1, wherein the fluid is CO_2.

10. The system of claim 1, wherein the heat radiating unit is a condenser.

11. The system of claim 1, wherein the heat absorption unit is an evaporator.

12. A refrigeration system comprising:

a heat absorption unit for absorbing heat from a peripheral portion to fluid under a predetermined constant pressure;

a compression unit for sucking the fluid discharged from the heat absorption unit and compressing;

a heat radiating unit for radiating heat from the fluid compressed in the compression unit and discharged to a peripheral portion under a predetermined constant pressure; and

an expansion unit for lowering pressure of the fluid which passed through the heat radiating unit by an adiabatic expansion and driving the first

compression unit and the second compression unit by work generated from the expansion.

13. The system of claim 12, wherein the compression unit is composed of a plurality of sub compression units installed sequentially to compress the fluid several times.

14. The system of claim 13 further including an intermediate cooling unit installed between the plurality of sub compression units for cooling the fluid compressed in each sub compression unit.

15. The system of claim 14 further including a cooling flow path for passing the fluid discharged from the expansion unit through the intermediate cooling unit.

16. A compressor of a refrigeration system comprising:

a driving unit;

a compression unit for compressing fluid by a driving of the driving unit and discharging to the heat radiating unit; and

an expansion unit for lowering pressure of the fluid which passed through the heat radiating unit by an adiabatic expansion and driving the compression unit by work generated from the expansion.

17. The compressor of claim 16, wherein the compression unit is composed of a plurality of sub compression units installed sequentially to compress the fluid several times.

18. The compressor of claim 17, further comprising an intermediate cooling unit installed between the plurality of sub compression units for cooling the fluid compressed in each sub compression unit.

19. The compressor of claim 18, further comprising a cooling flow path for passing the fluid discharged from the expansion unit through the intermediate cooling unit.

20. The compressor of claim 18, wherein the expansion unit is connected to the driving shaft so that the fluid can be expanded and thereby the driving shaft be rotated toward a direction which the fluid is compressed.

21. The compressor of claim 20, wherein the first compression unit and the second compression unit respectively includes:

an inner gear engaged to the driving shaft to rotate and having a plurality of teeth at an outer circumference surface thereof; and

an outer gear having insertion teeth the number of which is more than the number of teeth of the inner gear at an inner circumference surface thereof insertable by the plurality of teeth and having a center which is eccentric with a

center of the inner gear.

22. The compressor of claim 20, wherein the expansion unit includes:

an inner gear engaged to the driving shaft to rotate and having a plurality of teeth at an outer circumference surface thereof; and

an outer gear having insertion teeth the number of which is more than the number of teeth of the inner gear at an inner circumference surface thereof insertable by the plurality of teeth and having a center which is eccentric with a center of the inner gear.

23. The compressor of claim 22, wherein the first compression unit, the second compression unit, and the expansion unit have the outer gears of which radii are equal, and have the inner gears of which radii are equal.

24. The compressor of claim 20 comprising:

a plurality of partition wall units engaged to the driving shaft among the sequentially installed plurality of unit compression units and the expansion unit; and

a plurality of external wall units installed at a front end portion of the first compression unit and a rear end portion of the expansion unit for forming a compression chamber and an expansion chamber.

25. The compressor of claim 20, wherein the fluid is CO_2.

26. A refrigerator comprising:

a heat absorption unit for absorbing heat from a peripheral portion to fluid under a predetermined constant pressure;

a first compression unit for sucking the fluid discharged from the heat absorption unit and compressing;

an intermediate cooling unit for cooling the fluid compressed in the first compression unit;

a second compression unit for re-compressing the fluid discharged from the intermediate cooling unit;

a heat radiating unit for radiating heat from the fluid compressed in the second compression unit and discharged to a peripheral portion under a predetermined constant pressure;

an expansion unit for lowering pressure of the fluid which passed through the heat radiating unit by an adiabatic expansion and driving the first and second compression units by work generated from the expansion; and

a cooling flow path for passing the fluid discharged from the expansion unit through the intermediate cooling unit.

27. An air conditioner comprising:

a heat absorption unit for absorbing heat from a peripheral portion to fluid under a predetermined constant pressure;

a first compression unit for sucking the fluid discharged from the heat

absorption unit and compressing;

an intermediate cooling unit for cooling the fluid compressed in the first compression unit;

a second compression unit for re-compressing the fluid discharged from the intermediate cooling unit;

a heat radiating unit for radiating heat from the fluid compressed in the second compression unit and discharged to a peripheral portion under a predetermined constant pressure;

an expansion unit for lowering pressure of the fluid which passed through the heat radiating unit by an adiabatic expansion and driving the first and second compression units by work generated from the expansion; and

a cooling flow path for passing the fluid discharged from the expansion unit through the intermediate cooling unit.